



Report 99-107

Shunt L55 and Train 211

collision

Southdown

10 May 1999

Abstract

On Monday, 10 May 1999, at approximately 1825 hours, Train 211, a southbound express freight, pulled out of the Auckland Freight Centre and stopped to have a defective tail end monitor replaced. While it was stopped, a DSG shunt locomotive that was operating on a converging road ran into the rear of the train. The remote control operator who was operating the shunt from the rear refuge of the locomotive was thrown off by the impact. Safety issues identified included the suitability of the procedures, and compliance monitoring in place to ensure safe operation of remote control locomotives, and the suitability of procedures to control conflicting movements in the Auckland Freight Centre. Three safety recommendations were made to the operator.

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Contents

List of Abbreviations	ii
Data Summary	iii
1. Factual Information	1
1.1 Narrative	1
1.2 Operating instructions	3
1.3 Personnel	6
2. Analysis	7
3. Findings	8
4. Safety Recommendations	9

List of Abbreviations

ASP	Audio Shunting Procedure
LE	locomotive engineer
RCO	remote control operator
TEM	tail end monitor
Tranz Rail	Tranz Rail Limited
TX	train examiner

Rail Incident Report 99-107

Data Summary

Train type and number:	express freight, 211
Date and time:	10 May 1999, at approximately 1825 hours
Location:	Auckland Freight Centre, Southdown
Type of occurrence:	collision
Persons on board:	Shunt L55 crew : 1 Train 211 crew : 1
Injuries:	Shunt L55: 1 minor Train 211: nil
Damage:	minor damage to DSG locomotive and wagon
Operator:	Tranz Rail Limited (Tranz Rail)
Investigator-in-Charge:	R E Howe

1. Factual Information

1.1 Narrative

- 1.1.1 On Monday 10 May 1999, Train 211 was a scheduled southbound express freight train preparing to depart from the Auckland Freight Centre at Southdown. The train consisted of a DX locomotive and 23 bogie wagons with a total weight of 867 t and length 423 m.
- 1.1.2 At approximately 1825 hours the train had coupled on to its complement of tonnage from No. 11 road in the Auckland Freight Centre loading shelter and was being examined prior to its departure by a two-person train examiner (TX) team: the senior train examiner TX(1) covering the front half of the train, and a second train examiner TX(2) covering the rear half. Both were certified in train examiner operations and maintenance duties.
- 1.1.3 The train brakes had been pumped up and the tail end monitor (TEM)¹ was fitted to the last wagon in preparation for testing the brakes. Readings from the TEM itself indicated that it was functioning properly but when TX(2) contacted the locomotive engineer (LE) it was established that the transmitted signals were not being received by the head end monitor in the cab.
- 1.1.4 While testing the train brakes, TX(2) discovered that the last wagon in the rake (UK12826) had defective brakes which made it unsuitable to be the rear most wagon on the train. As it was impractical to shift the wagon forward in the rake, the wagon was cut out and TX(2) moved the TEM up to fix it to the next wagon. At the same time TX(1), who was near the head of the train, separately completed the T15 Train Certificate (signifying that the train was fit for travel) and took it to the LE.
- 1.1.5 After TX(2) had re-fixed the TEM and the LE had applied and released the air brakes it was established that the TEM signals were still not being received by the cab monitor. The TXs conferred by radio and considered that this could be due to interference from the structural steel of the loading shelter and TX(1) decided that the LE should “pull down the leg” to clear the building. The LE’s understanding was that the TEM was to be replaced when the train stopped but the TXs considered that once clear of any interference from the building it was likely that the TEM would function satisfactorily, in which case the train would keep moving and depart.
- 1.1.6 Following the radio discussion TX(1) spoke directly to the remote control operator (RCO) of Shunt L55 that was working in its defined work area in the vicinity to confirm if it was all right for Train 211 to move out. The shunt was in the process of transferring tonnage to the adjacent No. 12 road within the loading shelter. The RCO was not made aware of the TEM problem and understood Train 211 was departing. He gave his approval subject to the cross-over points being reset to Train 211’s departure route. Figure 1 below gives the site details.

¹ The TEM was a portable device fixed onto the rear of the last wagon of a train and connected to the Westinghouse brake system. Details of the brake pipe pressure at the rear of the train were then transmitted to the cab to give continuity checks to the LE on route.

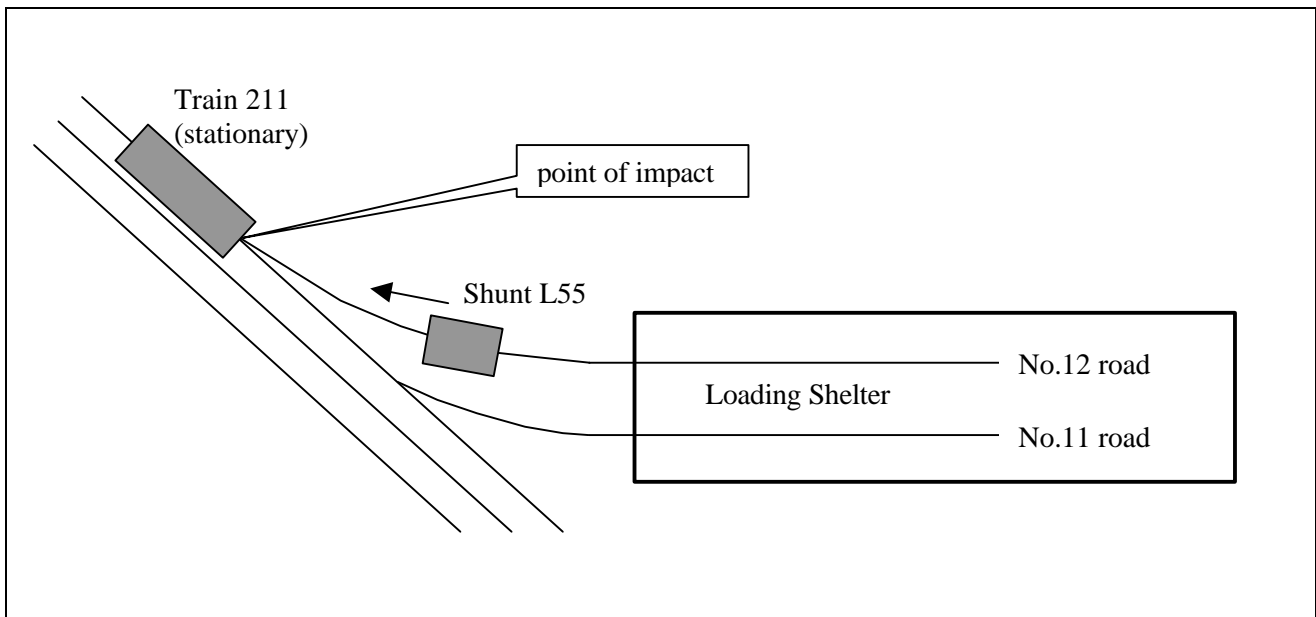


Figure 1
Site details at the Auckland Freight Centre loading shelter

- 1.1.7 TX(1) reset the points and gave authority for the LE to pull out. After the last wagon had exited the terminal building it was established that there was still no response from the cab monitor and TX(1) directed the LE to stop the train so that another TEM could be fitted. The train stopped with the last wagon sitting over the turnout that gave access to the No. 12 road to place it as close as possible to the van holding the new TEM.
- 1.1.8 TX(2) had uncoupled the defective TEM from the rear of the wagon when he heard a warning shout from TX(1) to get out of the way. TX(2) quickly glanced around, saw the shunt locomotive approach from behind him and managed to jump aside just before it impacted with the wagon. TX(1) estimated that it was approximately half a minute from the time Train 211 stopped to the time of the collision.
- 1.1.9 The RCO stated that he understood Train 211 was departing when he saw it leave the shelter as he completed his work in No. 12 road. He was unaware of a TEM problem or that the train had stopped. He had wagons to pick up from another siding off the ladder road and was in the process of returning to the ladder road from No. 12 road when he hit the rear of Train 211. The RCO estimated that it was “5 or 10 minutes” between being asked if Train 211 could go and the collision.
- 1.1.10 No. 12 road had a right hand curve as it approached the ladder road and the RCO was operating the shunt from the rear left-hand refuge of the locomotive. He stated that because of the restricted view line from his position he could not see the train and was not aware of it until the collision.
- 1.1.11 The RCO estimated the shunt to be travelling “at about walking pace”. The impact with the stationary train was sufficient to throw him forward onto the hand railing of the DSG locomotive. An ambulance was called and the RCO was taken to hospital and treated for a cut above his left eye.

- 1.1.12 Following the incident the damaged wagon was cut off the train and the new TEM was attached to the next wagon. Train brakes were applied and released, the LE confirmed that the cab monitor was receiving the appropriate signals and the train departed for Westfield after a delay of 35 minutes. The LE was not aware of the collision that had occurred at the rear of his train until he was informed of it at Westfield.
- 1.1.13 TX(2) stated that it was normal for Shunt L55 to have completed its transfer of tonnage to the loading shelter and have returned back to Westfield or at least be well clear by the time Train 211 was ready for departure. On the day in question he stated that prior to the collision he was unaware of the location of the shunt and had assumed that it had gone back to Westfield.
- 1.1.14 The weather was fine and visibility was clear at the time of the incident.

1.2 Operating instructions

- 1.2.1 The Auckland Freight Centre was designated a private siding in the Tranz Rail “Local Instructions and Operating Procedures” for the Auckland Terminal Area dated 4 April 1999. Clause 15.0 designated Auckland Freight Centre, Southdown as a tractor operated private siding. However, Tranz Rail advised that the Auckland Freight Centre was not a private siding and was operated by Tranz Rail shunting services. The work area for shunt L55 was all lines inside the “All Trains STOP” boards at Auckland Freight Centre. The only specific reference to joint operation procedures for the private siding in the “Joint Operating Plan” for the Auckland Freight Centre related to the operation of a shunting tractor and any shunt on all lines within the centre, as detailed in part 1, “Work Area” below:

Shunting

Westfield shunters have priority when moving wagons on these roads.

Shunting Tractor

If the shunt is working in the vicinity and wagons need moving with shunt tractor, the operator in charge must come to an understanding with the RCO as to how this is to be done.

On arrival of a shunting service at the Auckland Freight Centre, if it is seen that the shunting tractor is operating, the RCO in charge must first ask the operator working on the shunt to stop as soon as possible so shunting can commence . . .

- 1.2.2 Tranz Rail’s Working Timetable under “Hamilton-Westfield Station/Yard Instructions” made the following provisions for trains and shunting services at the Auckland Freight Centre:

6.16 Auckland Freight Centre

Trains and shunting services **must not** enter the work area of L55 Yard Shunting Service, which includes the major portion of the Auckland Freight Centre, until permission has been obtained from Senior Shunter L55 Shunt. The following arrangements apply:

6.16.1 Trains and Shunts Departing from Westfield for Auckland Freight Centre

For trains and shunts departing from Westfield, the Operations Controller must obtain permission from the Senior Shunter, L55 . . .

No specific procedures were in place for trains departing from the Auckland Freight Centre except for train examination for Train 211 covered in Tranz Rail's semi-permanent Bulletin 1218 dated 5 May 1999 (5 days before the incident) which amended instruction 2.7.2. of the working timetable to read:

2.7.2 Train No. 211 Auckland Freight Centre (Amended Instruction)

The examination of the train will be carried out by the Train Examiner Operations (maintenance based) with the exception that the Tranz Link Team Leader (or his deputy) will be responsible for ensuring all containers including flatracks are safe to run and that the required number of twistlocks and container/wagon doors are secured before authorising the train to depart.

The Train Inspection Certificate is to be signed by both staff as confirmation that their specific train inspection responsibilities have been carried out. The Team Leader will supply the Locomotive Engineer with the signed Train Work Order together with any hazardous substances documentation, overgauge permits etc. Rail Operating Code Section 5 Instruction 15 is modified accordingly.

However, the TXOs were aware that permission and clearance from the RCO of L55 shunt was needed before a train could be dispatched.

- 1.2.3 To ensure proper communication between various train/shunt services within the area the Local Instructions and Operating Procedures for the Auckland Terminal Area included:

2.0 Communication

..Yard radio communication will be as follows:

2.1 Communications between the Locomotive Engineer, Remote Control Operator, and the Shunting staff will be via radio on a dedicated ASP (Audio Shunting Procedure) channel.

Other yard work will be performed and signalled by hand, or using other radio channels.

The radio channels have been allocated as follows:

... ASP 5 (Shunt) L55 ...

- 1.2.4 Tranz Rail Operating Code, Section 5 (Operating Instructions for Yard Shunting and Allied Staff), (Issue No. 3, dated 8 December 1997) included the following instructions which related to this incident:

Care in Shunting

1.6 Common Territory

When shunting in an area of the yard common to more than one shunting service, or where a risk of collision exists with vehicles left foul of the running line, **movements**, whether propelled or hauled, **must be signalled** (hand or audio) **from a position at or near the leading end of the movement**, especially where one-person operation of shunting locomotives applies.

1.10 Maximum Speed of All Movements on All Lines other than Main Lines and Industrial Lines

The maximum speed of all movements on other than Main Lines and Industrial Lines must NOT exceed 25 km/h. The speed of the movement must be so regulated that it can be stopped in the clear distance seen ahead.

This also applied when signals are displaying a normal speed indication on a crossing loop.

Further speed restrictions may apply at various locations – see Local Instructions.

4.4 General Safety Instructions and Procedures for Remote Control Locomotives

...

Operators are required to work within the “range of vision”.

Range of vision means being able to see down the track in the direction of travel while having the movement under control. The range of vision will be influenced by such conditions as the weather, buildings, grade, propelling, time of day etc.

The Operator is required to take up a position with adequate range of vision in the area being shunted at all times. Keeping the “range of vision” may require significant movement on the part of the Operator.

It is the responsibility of the Operator that operations are always protected and carried out safely. While travelling through yards, the Operator or second person must ride on or precede the leading vehicle.

While shunting, the Operator’s position will be determined by the need to maintain adequate “range of vision”, especially shunting dead end roads, into and out of sidings, approaching road level crossings and areas of common territory.

The range of vision requirement may be shared by the Operator’s second person (where provided) when instructed to assist during shunting operations.

The Operator must sound the locomotive whistle approaching all level crossings, entering or pulling out of a siding/freight shed, or where other operating staff are not aware of your movements

- 1.2.5 The Master Train Plan for all freight train services within the Tranz Rail area showed that Train 211 was scheduled to depart from Auckland Freight Centre, making the Freight Centre a terminal station.

The Train Service Plan for Train 211 specified the following key close-offs:

Auckland Branch Shelter	17.55 hours
Auckland Branch 8 Road	18.15 hours
Loco on train	18.00 hours
Train departure	18.25 hours

In practice, the locomotive picked up tonnage from 8 Road first before coupling onto tonnage in the Branch Shelter (Road 11) and then departed.

- 1.2.6 Tranz Rail Operating Code, Section 5: Operating Instructions for Yard Shunting and Allied Staff (Issue 3, dated 8 December 1997) made a number of provisions for the inspection of freight trains at terminal stations (clause 15.4.1 refers) and included:

- a full terminal brake test
- cut out defective brakes (refer to Rule 160)
- checking of brake blocks, air hoses, drawgear connections, wheels, tyres, springs, loose rigging
- checking the security of loads, bond chains, ropes, dunnage
- correct end of train signals from the TEM
- advise LE results of inspection.

Rule 160 (Amendment No. 12 dated 28 February 99) set down the specific procedures to be followed when making a brake test and stipulated when this was to be done. It included:

160 (a) (iii) When a vehicle or vehicles are added or detached

Rule 160(e)(iii) stipulated how the test was to be carried out with a two-person team. It provided for the person in charge, (in this case TX(1)) to start at the locomotive end and the second person at the rear of the train, and with the brakes applied inspect along the same side of the train until they met. Results of the inspection were exchanged, the brakes released and the examiners crossed over and inspected the other side of the train back to their respective start points. The LE would then apply and release the brakes and the second person at the rear of the train would check brake pipe pressures on the TEM. The results of the test would be conveyed to the person in charge who would then complete the necessary documentation and advise the LE accordingly.

1.2.7 Rule 160(f) stipulated the procedures to follow in carrying out a brake test at an intermediate station where a vehicle or vehicles were added to or taken from a train. With regard to the deletion of a wagon, Rule 160(f)(ii) stipulated:

When the shunt is completed and the train is coupled through, the member making the test must stand . . . immediately behind where a division in the train was necessary to detach vehicle . . . and request the LE to “apply brakes” and “release brakes” and satisfy himself that the brakes on the . . . last vehicle, apply and release promptly in response to the testing signals.

1.2.8 Tranz Rail Operating Code, Section 3, Operating Instructions General (Issue No. 3, dated 24 November 1997) provided details relating to the functioning, fitting and testing of TEMs. It included:

. . . 2.3.5.1 Failure of TEM En Route

A break in the radio link to the head-end display unit may be due to the terrain (tunnels, for example), a failure of the TEM or a weak battery. . .

1.3 Personnel

1.3.1 The LE had 33 years railway experience and had been certified as an LE since 1973. The majority of time he had worked in Wellington but had spent the last two and a half years at Westfield. He held a current operating certificate for the duties concerned.

1.3.2 The RCO had 14 years railways experience and had been qualified as an RCO for 5 years. He had been recertified 2 weeks before the incident and held a current operating certificate for the duties concerned.

1.3.3 TX(1) had 23 years railway experience, including experience in Car and Wagon Depots in Auckland as a lifter and acting TX. He qualified as a TX 10 years ago in both operations and maintenance and held the appropriate certificate for the duties concerned.

1.3.4 TX(2) started with Tranz Rail 3 years previously in a track gang and had been qualified as a TX for 18 months in both operations and maintenance duties. He had been recertified in these duties 2 months prior to the incident.

2. Analysis

- 2.1 The possibility that the structural steelwork of the loading shelter could have interfered with the transmission of the TEM to the locomotive cab was a reasonable one, and moving the train was a practical way of checking the operation of the monitor. Tranz Rail's Operating Code made reference to the possible break in radio link with the head end display due to transmission interference in tunnels, and the same phenomenon could equally apply in a steel loading shelter.
- 2.2 The train certificate verifying that Train 211 was fit to travel was given to the LE before the brake inspection had been completed and before the TEM was known to be working. Rule 160(a)(iii) required that a brake test was necessary when a vehicle was detached from the rake. When TX(2) fitted the TEM to the last wagon for the second time while still in the loading shelter and requested the LE to apply and release brakes, he effectively carried out the requirements of Rule 160(f)(ii) for testing brakes at an intermediate station when a vehicle was added to or taken from a train. While no such requirements were defined for terminal stations there is no reason why they should differ.
- 2.3 Prior to moving out of the loading shelter the lack of signal from the TEM was known to the LE and both of the TXs. Although he had been given the train certificate, it is unlikely that the LE would have continued without a functioning TEM. It was the LE's understanding that he was to "pull down the leg", stop to have a new TEM fitted and his train would then have complied with certification requirements. Had the issue of the train certificate by TX(1) to the LE been delayed until the new TEM had been fitted and checked, as required by Section 5 of Tranz Rail's Operating Code, the RCO would have probably been aware that Train 211 was going to pull up and the incident could have been avoided.
- 2.4 While the new TEM was being fitted to the last wagon, the LE of Train 211 was about 400 m away in his cab. It was therefore understandable that he neither saw the incident nor felt the impact from the shunting locomotive. His not knowing of the incident until he reached Westfield was a by-product of the poor communication between operational staff at the site.
- 2.5 Although "range of vision" with regard to remote control operations is defined in the code (see paragraph 1.2.4) the definition does not clearly state the relationship between speed and stopping distance. However this is clearly stated in general shunting care requirements in Section 1.10 (see paragraph 1.2.4). It is considered desirable that Section 4.4 is either amended to reflect Section 1.10 and make it clearer what distance remote control operators working within "range of vision" are required to stop in, or that a different distance is defined if considered necessary to ensure the remote control operation is under control. In the case of L55 shunt the RCO's position in the left rear refuge while negotiating a right hand curve severely restricted his forward view. The position taken up by the RCO did not allow him to work within the range of vision at the speed of operation, and did not enable him to stop in the clear distance ahead at the speed of operation.
- 2.6 TX(1)'s estimate of half a minute between Train 211 stopping and the collision was consistent with the RCO's estimate of between "5 or 10 minutes" between being asked if Train 211 could go and the collision. The latter elapsed time is more likely to have been the 5 minutes and would have been taken up in setting the correct route for Train 211, the train moving off and then braking to a stop. The train moved approximately 450 m.
- 2.7 TX(1)'s failure to notify the RCO of the need to stop the train foul of the ladder road did not support his stated understanding of the need to communicate with the RCO regarding movements involving the dispatch of main line trains, and was a direct result of the lack of formal procedures for the dispatch of trains.

2.8 Procedures for the arrival of trains and shunts to the Auckland Freight Centre were contained in 3 different documents:

- Local Instructions and Operating Procedures for the Auckland Terminal Area
- Joint Operating Plan for the Auckland Freight Centre
- Working Timetable.

Generic reference was also made in the Tranz Rail Operating Code.

However, no specific instructions were in place for dispatching trains from the Auckland Freight Centre. The amended instructions to Clause 2.7.2 of the Working Timetable outlined the responsibility for ensuring that the train was fit for travel before dispatching from the Auckland Freight Centre but there is a need for the Local Instructions to include procedures covering train departures to avoid the type of conflict which occurred.

2.9 Notwithstanding the lack of procedures for dispatching trains, both TXs were aware that permission and clearance was required from the RCO before a main line train could be dispatched. While TX(1) was aware of the presence of Shunt L55 in the yard, TX(2) was not. Had there been better communication between the staff, TX(2) may have been more alert to potential conflicting movements.

2.10 Although the procedures for dispatching trains were not in place, the various documents mentioned in 2.8 above did contain a number of defences, any one of which could have avoided the collision. However, these defences were eroded by a series of procedural violations by some staff involved.

3. Findings

Findings and any safety recommendations are listed in order of development and not in order of priority.

3.1 All staff were appropriately certified for the duties involved.

3.2 The T15 Train Certificate was completed and given to the LE before the train was fit to travel, contrary to Tranz Rail Operating Code, Section 5 clause 15.4.1.

3.3 TX(1)'s request to the RCO for approval to depart did not allow for the known possibility of failing to establish correct TEM operation after the train had left the loading shelter.

3.4 TX(1) failed to notify the RCO once it was known that Train 211's dispatch would be interrupted and that it had stopped foul of the ladder road entry.

3.5 The RCO's position on the left rear refuge was inappropriate for the movement, and in particular:

- was not at or near the leading end of the movement
- did not allow him to see down the track while having the movement under control.

4. Safety Recommendations

4.1 On 29 November 1999 the Commission recommended to the managing director of Tranz Rail that he:

4.1.1 Reinforce the training and increase the compliance monitoring of remote control operators to ensure they are positioned and operate in such a manner that a combination of:

- range of vision
- normal operating distractions and
- shunting speed

maintain an acceptable factor of safety with respect to possible collision (043/99); and

4.1.2 Amend existing code instructions and training procedures for the operation of remote control locomotives to ensure they include:

- a definition of what constitutes “adequate” when describing “range of vision” with particular regard to speed and the need to stop in a distance related to the clear distance seen ahead.
- unambiguous guidelines as to the best position for operators on the leading vehicle, taking account of curved track and limitations imposed by positioning themselves on the trailing end (044/99); and

4.1.3 Consolidate and clarify procedures to avoid conflicting movements in the Auckland Freight Centre and include procedures for the dispatch of trains (045/99).

4.2 Safety recommendation 043/99 is similar to safety recommendation 066/99 made with respect to Railway Occurrence 99-111 at Kinleith, although the latter related to a propelling movement.

4.3 Safety recommendation 044/99 is similar in principle to safety recommendation 067/99 made with respect to Railway Occurrence 99-111 at Kinleith although the latter related to a propelling movement.

NB THE FOLLOWING RESPONSE WAS NOT IN THE PUBLISHED ACCIDENT REPORT

4.4 On 23 December 1999 the managing director of Tranz Rail responded as follows:

4.4.1 **043/99**

Tranz Rail has changed the Safety Observation Process specifying a minimum of three formal observations within a two year period at no more than eight month intervals.

Training in the new procedures has been completed for Managers and implemented at Supervisory level.

All instructions in the Rail Operating Code relating to the movement of shunts in Terminals are being reviewed as detailed in our response to Safety Recommendation 044/99 below.

044/99

Tranz Rail is reviewing Section 5 of the Rail Operating Code with the intention of rewording and reorganising all procedures relating to the movement of shunts (remote control or otherwise) in Terminals as we can see that the relevant information is contained in a number of sub sections

and would be better understood if all associated instructions were grouped together.

This review is planned for completion during the first half of next year.

045/99

In the new year, Tranz Rail intends reviewing the procedures relating to movements in the Auckland Freight Centre including those for the dispatch of trains and will consolidate and clarify these as appropriate.

Approved for publication 1 December 1999

Hon. W P Jeffries
Chief Commissioner